PATENT ABSTRACTS OF JAPAN

(11)Publication number : **08-036744**
(43)Date of publication of application : **06.02.1996**

(51)Int.CI. **G11B 5/72**
G11B 5/84

(21)Application number : **06-173956**
(22)Date of filing : **26.07.1994**

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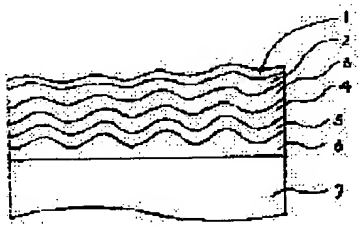
(54) MAGNETIC RECORDING MEDIUM

(57)Abstract:
PURPOSE: To improve a mechanical nature and at the same time, to enhance compatibility with a lubricant by providing a carbon protective film in which N is not contained on the base body of an Al alloy and thereon providing a carbon protective film containing N, H, and a lubricant.
CONSTITUTION: A NiP-plated layer 6, a Cr backing layer 5, a carbon protective film 3 in which N is not contained and a carbon protective film 2 containing N and H, are provided in that order and further a lubricant layer 1 is provided thereon. The protective films 2, 3 are composed of at least not less than 50 atomic % of C. The rest part is composed of not more than 7.5 atomic % of O and not more than 10 atomic % of Ar. Further, the thickness of the protective films 2, 3 is 15 to 50Å, and the surface roughness is 30 to 300Å in the center line average roughness Ra. In addition to the above, the protective film 2 contains N and H. Thereby, the mechanical nature is improved and compatibility with the lubricant 1 is enhanced, so that durability may be enhanced and the sticking may be hard to be brought about even by the environment of a high temperature and high humidity.



LEGAL STATUS

[Date of request for examination]

[Date of sending the examiner's decision of rejection]

[Kind of final disposal of application other than the examiner's decision of rejection or application converted registration]

[Date of final disposal for application]

[Patent number]

[Date of registration]

[Number of appeal against examiner's decision of rejection]

[Date of requesting appeal against examiner's decision of rejection]

[Date of extinction of right]

* NOTICES *

1. This document has been translated by computer.So the translation may not reflect the original precisely.
2. **** shows the word which can not be translated.
3.In the drawings, any words are not translated.

CLAIMS

[Claim(s)]
[Claim 1] The magnetic-recording medium characterized by being the magnetic-recording medium which comes to prepare a magnetic-recording film and a protective coat at least, for the protective coat consisting of C more than 50 atom %, N of 1 - 30 atom %, and H of 5 - 10 atom % at least, and the remainder consisting of Ar below O below 7.5 atom %, and 10 atom % on a base.
[Claim 2] The magnetic-recording medium characterized by being constituted so that it consists of more than two-layer [of the composition from which a protective coat differs] in the aforementioned magnetic-recording medium, or composition may change continuously and N concentration on the front face of a protective coat may become higher than N concentration of an interface with a magnetic-recording film between an interface with a magnetic-recording film, and a front face.
[Claim 3] The magnetic-recording medium which it is in the range whose thickness of a protective coat is 15-500A, and the range of the surface roughness is 30-300A in Ra in center line average coarseness in the aforementioned magnetic-recording medium, and is the range/or whose maximum granularity Rmax is 50-500A, and is characterized by the area load factor of 10% of range being 25% or less from the greatest salient height in the bearing ratio curve.
[Claim 4] The magnetic-recording medium by which the lubricant which makes a ** fluorine polyether main structure on the protective coat is applied to the thickness of 5-30A, and is characterized by the thing of the chain of the lubricant molecule for which it had the polar group at the end at least, and 25% of the weight or more of the lubricant molecule has produced chemical absorption in the protective coat in the aforementioned magnetic-recording medium.
[Claim 5] the aforementioned magnetic-recording medium -- setting -- inert gas -- what added N2 1-80-mol % gas to Ar preferably -- Or the discharge gas which mixed one or more sorts of H2 gas and hydrocarbon gas to the concentration not more than 80 mol % to total pressure is used for N2 gas. The magnetic-recording medium characterized by having the carbonaceous protective coat by which sputtering is carried out by the power flux density of 2 cm 1.5-9W /while impressing bias voltage so that a base may be set to -5 or -450V to the box of a sputtering system, and its manufacture method.

[Translation done.]

* NOTICES *

DETAILED DESCRIPTION

[Detailed Description of the Invention]
[0001]
[Industrial Application] About the magnetic-recording medium which performs informational record and informational reproduction between the magnetic heads, this invention has the suitable granularity especially for a front face, and relates to the magnetic disk with which the carbonaceous protective coat and the fluid lubrication film were prepared.
[0002]
[Description of the Prior Art] The magnetic disk unit is used as equipment for carrying out the reproduction output of the information which recorded information on the magnetic-recording medium conventionally, or was recorded. In a magnetic disk unit, a magnetic disk is rotated at high speed, and informational record and informational reproduction are performed, maintaining the magnetic head with the pressure of the air film generated on the front face, and surfacing a 0.05-0.3-micrometer minute gap. For this reason, when dust and a salient exist in the gap of the magnetic head and a magnetic disk or a shock is added, the magnetic disk and the magnetic head which are rotated at high speed collide, and there is a possibility that the magnetic-recording film of a magnetic disk may be destroyed and it may become impossible to perform informational record and informational reproduction. In a small magnetic disk unit which is used especially for a personal computer Although the above-mentioned risen [to surface] type magnetic head is used, at the during starting which cannot generate the pressure of air films for surfacing of the magnetic head with an enough rotational speed of a magnetic disk, and the time of a halt Since it contacts and the contact start and stop (henceforth, CSS) method which ******** are used, the magnetic head and a magnetic disk have a possibility that may originate in the repeat of CSS and a magnetic-recording film may stop functioning as a record medium in response to the injury on wear etc. Then, in order to protect a magnetic-recording film from these injuries, a carbonaceous protective coat is prepared in a magnetic-disk front face, and, usually lubricant is applied further. As a means to form a carbonaceous protective coat, the magnetron sputtering method which generally makes an argon a discharge gas is used in consideration of adjustment with a means to form the membranous controllability and membranous magnetic-recording film of many properties etc. Moreover, generally carbonaceous material, such as graphite and a glassy carbon, is used for the target. However, the carbonaceous protective coat formed by this method had the problem that endurance sufficient as a protective coat of a magnetic disk was not necessarily expectable. What a carbonaceous protective coat tends to be made to carry out suitable amount content of the H by carrying out suitable amount mixture of the gas which contains hydrogen in a discharge gas, for example, the methane, and the ******-proof kinesis by the repeat of CSS tends to be improved as indicated by JP,2-282470,A, and it is going to raise the reliability of a magnetic disk for there is performed.
[0003]
[Problem(s) to be Solved by the Invention] Although it was as aforementioned that the endurance over CSS of a high cycle can be raised by making a carbonaceous protective coat contain H of a suitable amount, the carbonaceous protective coat which added only H had the problem of which an adsorption power with the magnetic head increases under a high-humidity/temperature environment, and rotation of a magnetic disk tends to consist difficult. Moreover, usually in the carbonaceous film formed by the sputtering method, H of a considerable amount contained unescapable, and it was difficult to always control the amount of H in a film the optimal. For this reason, there is a problem that coating thickness of the lubricant made into the cause of head adsorption must be made thin, or surface roughness of a magnetic disk must be enlarged, endurance cannot fall or head surfacing height cannot be made low, and it had become the obstacle of a raise in the recording density of a magnetic disk. From the above situation, making surface roughness small as much as possible, in order to make the surfacing height of the magnetic head low as much as possible for a raise in the recording density of a magnetic disk, and an opposite technical technical problem called the protective coat which has high endurance to CSS of the high cycle in necessary minimum thickness occur, and even if it is the case where the lubricant of sufficient thickness is applied still more lubriciously, it is called for that the magnetic head cannot cause adsorption easily under a high-humidity/temperature environment.
[0004]
[Means for Solving the Problem] A carbonaceous protective coat is preferably formed in a magnetic-recording medium front face by carrying out sputtering of the carbonaceous target by making into a discharge gas inert gas and the gas which carried out suitable amount mixture in the range given [N2 gas] in a claim at least at Ar, and carried out suitable amount mixture of at least one or more sorts of H2 gas or hydrocarbon gas if needed further.
[0005]

[Function] Generally the carbonaceous protective coat formed by the sputtering method is amorphous structure, and, usually H of a considerable amount is contained unescapable in the film. By carrying out termination of the carbonaceous uncombined hand (dangling bond), this H stabilizes amorphous structure and changes a membranous mechanical property by changing the structure of amorphous structure carbon further. It is the same even when mixing H2 or hydrocarbon gas in sputtering gas. On the other hand, although the nitrogen incorporated in the carbonaceous protective coat from sputtering gas hardly exerts change on carbonaceous amorphous structure, it has the effect which suppresses the amount of H contained in a film, and raises compatibility with lubricant. Consequently, it becomes possible to control arbitrarily the chemical property and the mechanical property of a carbonaceous protective coat front face.

[0006]

[Example]

(Example 1) a substrate conveyance type sputtering system (rye bolt company VZ1200 type) -- using it -- Ar -- N2 -- 40-mol % -- the CSS endurance of the magnetic disk which has the carbonaceous protective coat which carried out direct-current magnetron sputtering of the graphite target, and formed it in the mixed discharge gas is shown By Ra, surface roughness is applied to the thickness of about 25A by about 55A, and lubricant (MONTEKACHINI phon BURIN Z-DOL) is applied by the dipping method. The CSS test was performed using the AlTiC system slider with ordinary temperature normal relative humidity and high-humidity/temperature (30degree-C80%R.H.). the magnetic disk which prepared the carbonaceous protective coat of this invention as shown in drawing 2 -- especially -- the head adsorption under a high-humidity/temperature condition -- practical use -- it turns out that sufficient grade decreases In addition, it is good not to be what you may be glass, ceramics, carbon system material, or an organic macromolecule, and granularity was positively given although it usually formed in order of the ground film, the magnetic-recording film, the carbonaceous protective coat, and the lubricant film on the base to which suitable surface roughness was given with the magnetic disk used now and the aluminium alloy to which NiP plating was given was common to the base. Although Cr is common on a ground film, if needed, material and composition can be changed or it can also omit. Although it may be constituted so that a carbonaceous protective coat may be formed through a carbonaceous film or metal **** etc. from which the above composition differs further if needed or composition may change in the direction of thickness continuously, it is required for the surface of a protective coat to contain N at least, and to consist of interfaces with a magnetic-recording film so that N concentration may become low near the front face. In addition, after the method of giving granularity to the front face of the magnetic-recording medium created by the aforementioned method forms even a magnetic-recording film using the base to which granularity is not given beforehand, it does not form a thin film in the shape of an island, or does not interfere by the method of obtaining the surface roughness of business by the suitable means of distributing a particle, either.

[0007] (Example 2) Drawing 3 shows the CSS property under the high-humidity/temperature condition of the carbonaceous protective coat which carried out graphite target direct-current magnetron sputtering using the substrate conveyance type sputtering system (Japanese Vacuum-technology SPL-300 type) (30degree-C80%R.H.). When (a) makes pure Ar gas a discharge gas. When sputtering of the (b) is carried out to Ar by the discharge gas which mixed 30-mol % of methane. (c) shows the CSS test result at the time of carrying out sputtering to Ar gas in the discharge gas which mixed N2 [a 30 mol %] and H2 [20 mol %], respectively. Lubricant applied about 25A of phon BURIN AM 2001 of MONTEKACHINI for all by the dipping method. CaTiO2 system slider material was used for the CSS test. As for the magnetic disk which prepared the carbonaceous protective coat of this invention from this result compared with the carbonaceous protective coat by which sputtering was carried out in pure Ar, it turns out that the remarkable increase in frictional force is not accepted after repeating CSS of a high cycle, but it excels in the reliability the head adsorption which poses a problem practically is not accepted to be, either.

[0008]

[Effect of the Invention] The magnetic-recording medium excellent in the reliability from which the endurance over CSS of a high cycle is raised, and head adsorption cannot take place easily under a high-humidity/temperature environment can be obtained by improving a mechanical property and raising compatibility with lubricant simultaneously by making the carbonaceous protective coat of amorphous structure contain N and H at least.

[Translation done.]